



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,809	09/16/2003	Sciji Nagai	T36-159069M/KOH	1114
21254	7590	07/18/2006	EXAMINER	
MCGINN INTELLECTUAL PROPERTY LAW GROUP, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817			RAO, G NAGESH	
			ART UNIT	PAPER NUMBER
			1722	

DATE MAILED: 07/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/662,809

Applicant(s)

NAGAI ET AL.

Examiner

G. Nagesh Rao

Art Unit

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 5 and 16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Allowable Subject Matter

1) The indicated allowability of claim 4 is withdrawn in view of the newly discovered reference(s) to Tischler (US PG Pub 2002/0028314). Rejections based on the newly cited reference(s) follow.

Claim Objections

2) Claims 5 and 16 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 5 depends from claim 2 which depends from claim 1 and claim 16 depends from claim 8. Both claims 1 and 8 refer to temperature limitation ranges from 800-900⁰ C, however claims 5 and 16 refer to ranges that occur at a temperature not lower than 1000⁰C which would contradict the range specified in their respective parent claims.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3) Claims 1-2 and 8-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant claims the a method utilizing halide vapor phase epitaxy deposition, however upon review of the specification, the HVPE process utilizes HCl gas etchant in carrying out the claimed “halide” process. The HCl is not a halide but a hydride agent, and further proof is substantiated in the art rejection below utilizing the Tischler (PG Pub 2002/0028314) reference as evidence that HCl when used encompasses a hydride vapor phase epitaxy method.

Furthermore applicant has introduced a set of ranges 800-900⁰C in specifically claims 1, 8, and 9 but has the specification stated that the process neither occur above or below the 1000⁰C range. This would be in clear contradiction of what is stated in the specification.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- 4) Claims 1-18 are rejected under 35 U.S.C. 102(e) as anticipated by Tischler (US Pg Pub 2002/0028314).

Examiner has reviewed applicant's arguments and after consideration is withdrawing the initial rejection over the prior art of Shibata 610. However examiner is putting forth Tischler 314 since it appears to read on applicant's teachings. Examiner is also withdrawing the allowability of claim 4 based on discovery of the Tischler 314 reference.

Tischler 314 pertains to a process for producing Gallium-Nitride (GaN) semiconductor substrates via a variety of various methods in examples disclosed in the specification furthermore note that Tischler 314 refers to the GaN layer as a metal nitride (M*N) however that is understood by the examiner to be a synonym for a Group III-V nitride material (See Sections 0002-0013). Tischler 314 teaches a

sacrificial silicon substrate having been etched away via HCl while the substrate/M*N structure is preferably maintained (See Sections 0014-0019).

The M*N layer for example GaN may be deposited directly on the surface of the crystalline or non-crystalline substrate, or alternatively it may be deposited on an upper most surface of one or more intermediate layers which in turn are deposited on the crystalline substrate. The one or more intermediate layers may serve as a buffer layer to enhance the crystallinity of the M*N layer, as a template for the subsequent M*N growth thereon, or the intermediate layer(s) may serve as protective layer(s) or as an etch stop to prevent the etchant for the sacrificial substrate from etching into the M*N material (See Section 0020-0021) but thereby denoting that the etch could occur from the rear portion of the sacrificial substrate since the intermediate buffer layers are followed by the substrate before the top layer of M*N is completely processed. As well the M*N layer could contain more aluminum in the Group III nitride compound in the event the layer is decidedly an AlN layer or a AlGa_N or AlGaInN layer (See Sections 0092-0093).

The growth of the M*N layer material may be carried out in a HVPE reactor whereby although denoted as a hydride vapor phase epitaxy reactor, examiner qualifies this as an equivalent and capable of handling applicant's claim of a halide vapor phase epitaxy. Upon reviewing applicant's specification, examiner noted the

reference of HVPE as being a halide based reactor due to the use of HCl (applicant's specification) as a gaseous etchant with respect to the specification language on page 10 Lines 9-20. Although Tischler 314 denotes HVPE differently, it does disclose the use of HCl as the gaseous etchant for creating the free standing M*N semiconductor substrate.

Furthermore Tischler 314 teaches processing parameters for the HVPE method have temperatures growth for a GaN layer be between 1000-1200⁰C and the desired thickness range be between 1-1000 microns but preferably at 100-300 microns thus reading on claimed thickness and temperature variations as claimed by applicant (See Section 0050 and 0025) as well the ability to grow more than one layer of M*N materials as suggested by the language of section 0051. However as noted in that preferred embodiment the process begins with a "...growth temperature (in the range of 800-1300⁰C) and introducing the growth precursors for GaN formation...", therefore covering said 800-900⁰C range claimed by applicant.

Finally Tischler 314 teaches an ability to prevent lattice mismatch dislocation in particular preventing dislocations i.e. warping of the M*N substrate material which is in turn a form of a Group III nitride compound (See Section 0040). This and the fact that the methodology of creating said substrate will have

the rear surface of said silicon substrate opposing the surface on which said group III nitride compound semiconductor layer is formed.

Response to Arguments

5) Applicant's arguments filed 6/27/06 have been fully considered but they are not persuasive. Examiner notes the following.

Applicants never put forth evidence to suggest the contrary that the HCl is known to be used as a hydride and not a halide agent. Applicant's contend that its use is in a halide vapor phase epitaxy, however examiner put forth the argument that the term was used incorrectly. That HCl was in fact a hydride agent and the Tischler 314 reference was evidence to suggest that its use denotes a hydride vapor phase epitaxy process not a halide. Unless applicant puts forth evidence to suggest otherwise the 112 rejection stands.

Examiner also respectfully submits that there appears to be contradiction with the way the claims are written defining a range of 800-900⁰C range followed by dependent claims that state no lower then 1000⁰C range for the GaN formation. This discrepancy can be found throughout the specification as well. It is suggested that this subject matter be corrected or further clarified as to the essential necessary temperature range.

Lastly examiner maintains the 102 rejection because Tischler 314 still teaches the prescribed elements, ranges, and process claimed by applicant. The narrowed temperature range claimed by applicant still falls within scope of what is taught by Tischler 314 as noted in the rejection above.

Conclusion

6) Applicant's amendment necessitated the new ground(s) of rejection and objections presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to G. Nagesh Rao whose telephone number is (571) 272-2946. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on (571)272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



ROBERT KUNEMUND
PRIMARY EXAMINER

GNR